

Returning Patients After Primary Percutaneous Coronary Angioplasty: The (re)-TRANSFER AMI

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Following publication of the ST segment elevation myocardial infarction (STEMI) guidelines in 2004,¹ primary percutaneous coronary angioplasty (P-PCI) became the reperfusion treatment of choice for the treatment of these patients, and STEMI networks started to work as a “hub and spoke” model.

The number of primary angioplasty interventions performed by catheterization laboratories in hub centers increased as patients from “spoke centers” (peripheral units) were admitted to the “hub” (specialized central interventional units) for primary angioplasty. However, the number of available intensive care unit (ICU) beds did not grow at the same rate.

Hence, the early return of patients to their original spoke centers looked inviting, as it meant that mechanical reperfusion therapy could be offered not only to hub center patients but also to patients from spoke centers.

There are several potential risks associated with the immediate re-transfer of patients from hub to spoke centers. The first, potentially fatal, risk is arrhythmia. Mehta et al² recently published data on the incidence of major arrhythmia (ventricular tachycardia and fibrillation) in 5745 patients treated with P-PCI in the APEX AMI trial. They found that ventricular tachycardia/fibrillation (VT/VF) occurred in 329/5745 patients (5.7%), usually before catheterization was completed (64%). However, in 117/329 patients (35.5%) the arrhythmic event occurred after catheterization, although in 90% of cases it occurred within 48 hours. Clinical outcomes were worse in patients with VT/VF (90-day mortality 23.2% vs 3.6% in patients without VT/VF).

Outcomes were also worse if major arrhythmias occurred later rather than earlier (90-day mortality

in early VT/VF 17.2% vs 33.3% in late VT/VF patients).

In multivariate analyses, factors associated with early arrhythmias were: pre PCI TIMI 0 flow; inferior infarction; total baseline ST deviation; creatinine clearance; Killip class greater than I; baseline systolic blood pressure; body weight; and baseline heart rate over 70/min.

Factors related to late arrhythmias were systolic blood pressure, ST resolution under 70%, baseline heart rate over 70/min, total baseline ST deviation, less than grade 3 post PCI TIMI flow, pre PCI TIMI flow grade 0, and less than 24 hours of treatment with beta-blockers.

These data are in line with our own findings,³ which showed that major ventricular arrhythmias occurred in 11% of 689 patients treated with P-PCI for STEMI, with most events occurring during or before P-PCI.

Major bleeding from the access site, especially if the femoral approach is used, is another potentially fatal event that can occur during transportation.

Fuchs et al⁴ reported major bleeding in 27/831 patients (3.5%) treated with P-PCI, though patients in that study were older, more frequently female, in cardiogenic shock, and with higher CADILLAC scores and activated clotting time levels.

Significant predictors in multivariate analysis were female gender, ACT>250 s, and use of an intra-aortic balloon pump (IABP).

Major bleeding was associated with increased 6 month mortality rates (37% vs 10%; $P=.0001$) and a need for blood transfusions. It remained significant after adjusting for baseline CADILLAC scores (37% vs 19.4%, $P=.05$).

The development of cardiogenic shock is another potentially lethal event which can occur during transportation to the spoke center. However, in our experience,³ this event occurred mainly before or during primary angioplasty.

Stent thrombosis is another early and potentially fatal complication of primary angioplasty; especially when full platelet inhibition is not reached in the early post-procedural phase. The use of abciximab or bivalirudin in primary angioplasty can reduce this phenomenon.

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The study by Estévez et al⁵ provides information on the feasibility of returning STEMI patients to their referral centers after P-PCI. The study involved a cohort analysis of 200 consecutive STEMI patients who returned to their spoke centers after P-PCI. The study included a control group of 297 matched cases.

Several criteria were taken into account to exclude early re-transfer, including post-procedure persistent chest pain, haemodynamic instability, acute severe congestive heart failure, multi-vessel or left main disease, and atrial-ventricular block.

Transfer was also delayed if a second procedure was required the following day or if it meant the patient would arrive during the night.

No significant differences were observed between the returning patients and the control group in terms of major adverse cardiac events (MACE). Mortality was, however, higher in the control group (3.7% vs 1% for the retransfer group), although the differences were not statistically significant ($P=.064$).

Mortality was very low (1%) in returning patients despite a longer time to treatment when compared to the control group (door-to-balloon time over 120 minutes). This is probably explained by the fact that higher risk patients were included among the controls and were not selected for early retransfer to the spoke center for treatment.

There was no difference in the proportion of patients receiving stent thrombosis in the two groups (2% vs 1.3%; $P=.570$) and major arrhythmias during retransfer were not recorded. Retransfer was not immediate (median length of hospital stay, including time in the cath-lab, was 8 hours). This strategy probably allowed early stratification of patients with STEMI but it also required admission to the hub's intensive care unit, making it an expensive strategy.

No major bleeding was reported in the retransfer group despite frequent use of abciximab. This was likely due to the high use of radial access (74%).

During follow-up, 10 patients in the retransfer group (5%) required a new catheterization during the first month. Further catheterization was more frequent in transferred patients compared to the control group (2.5%), though the difference was not statistically significant. Sub-acute stent thrombosis occurred in 4 (2%) cases. Two of the cases occurred in patients who had been discharged from their reference hospital.

The other patients had "elective" catheterization, though in two cases the intervention was performed before return to the spoke center due to residual dissections. In our opinion, this suggests that it is an urgent and not an elective indication.

A new catheterization was performed in 21 of the non-retransfer patients (26.6%) though the reason

for this high rate of re-catheterization, given the proportion of patients with multi-vessel disease (8.8%), is unknown.

The work of Estévez is similar to that published by our group in 2001.⁶ We found that transfer to the spoke centers was possible in the first 2 hours post-intervention, though our study sample consisted of higher risk patients. In our study, an intra-aortic balloon pump was used in 12% of re-transfer patients but in these cases a skilled team was needed at the spoke center as well as during transport by ambulance. We also observed a higher bleeding rate (6.7%) because of the use of femoral access and the very high rate of intra-aortic balloon pump implantation (25%).

We also found that mortality was low in re-transfer patients (3.9%) and similar to that of patients who were not transferred (4.7%). The incidence of other MACE was also similar in the two groups. We can therefore conclude that post-procedural transfer is safe and feasible.

Re-transferring patients with STEMI to the spoke center has been shown to be safe in this and other studies. The practice can help to mitigate the health care and economic overload associated with P-PCI programs. The low mortality rate reported in this study was due to the careful selection of re-transfer candidate patients, which was also a major study limitation.

Other possible confounders include the median hospital stay of 8 hours, which may suggest that re-transfer to the spoke centers was not immediate, and the fact that medical ambulances were used for re-transfer. These may not be available in all countries.

Other (perhaps multi-center) studies are needed to determine whether an immediate return after P-PCI is equally safe and cost-effective when medical care during transport is not required.

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